

SECOND SEMESTER 2021-22

Course Handout Part II

15-01-2022

In addition to part‑I (General Handout for all courses appended to the timetable), this portion gives further specific details regarding the course.

Course No. : **MATH F242**

Course Title : **OPERATIONS RESERACH**

Instructor‑in‑charge :  **DK SATPATHI**

Instructors : DK Satpathi, Ashwini S, Tathe Kartik Vilasrao

1. **Scopes and Objective of the Course:**

This course begins with applications overview of Operations Research, and introduces dynamic programming and network models. After a review of probability distributions, inventory models and queuing systems will be covered. Decision- making under certainty, risk, and uncertainty; along with an introduction to game theory will be dealt. Finally simulation techniques, introduction for estimating solutions to problems, that are not amenable to conventional solution techniques, will be made. Students will also be taught the basic concepts on system reliability.

**2.** **Text Book:**

1. Hamdy A Taha, “Operations Research: An Introduction”, Pearson Education, Tenth Edition, 2018.
2. Venkateswaran S and B. Singh, “Operations Research” EDD Notes.Vol.3, 1997.

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**3. Reference Book:**

1. Hillier and Lieberman, Bodhibrata Nag, Preetam Basu, “Introduction to Operations Research”, T M H, Tenth Edition, 2017.
2. Bernard W. Taylor, “Introduction to Management Science Twelfth Edition, Pearson,2016
3. Anderson, Sweeney and Williams, “Quantitative methods for business Eleventh Edition”, Cengage Learning, 2009.
4. Ayyub, B.M. and McCuen R.H., “Probability, Statistics and Reliability for Engineers and Scientists”, Chapman & Hall 2e, 2003.

4. Lecture Plan

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| **Lecture Nos.** | **Learning Objectives** | **Topics to be Covered** | **Chapter in the Text Book** |
| 1 | Introduction to Operations Research | Introduction, Historical Development, Impact of O.R., Phases of O.R., Overview of O.R., Modeling Approach | Chapter 1 (T1) |
| 2-4 | Review of Basic Probability | Random variables, Binomial, Poisson, Exponential and Normal Distribution | Chapter 14 (T1)  14.1,14.2,14.3,14.4 |
| 5-13 | Introduce Queueing Systems | Definition, Birth and Death process, Role of Exponential Distribution, Generalized Poisson Queueing Models,  Specialized Poisson Queues. | Chapter 7 (T2)  7.1,7.2,7.3,7.4,7.5  7.5.1, 7.5.2, 7.5.3, 7.5.4, 7.5.5, 7.5.6 |
| 14- 20 | When to produce / purchase and how much | Deterministic and Probabilistic Inventory Models | Chapter 8 (T2)  8.1,8.2,8.3(Model I, Model II,  Model III, Model IV, Model V)  8.4(Model VII, Model VIII) |
| 21-25 | How to solve complex system and basic concept of simulation | Introduction, Generation of random variates from different distributions, Simulation of Single-server queueing model and inventory model. | Chapter 9 (T2)  9.1,9.2,9.4,9.4.1,9.4.8,9.8,9.9 |
| 26-30 | To understand the basic  concept of Reliability | Basic concepts, Hazard rate function, Reliability of the  systems, failure time distributions. | Chapter 6 (T2)  6.1,6.2,6.3,6.4,6.4.1,6.4.2  6.9,6.9.1,6.9.2 |
| 31- 33 | Learn about Decision analysis and Game theory | Decision analysis under uncertainty and Game Theory | Chapter 15 (T1)  15.3,15.4 |
| 34-37 | Learn basic concepts Network Models | Definition, Shortest route Problem, CPM and PERT | Chapter 6 (T1)  6.1,6.5.1,6.5.2,6.5.5 |
| 37-40 | To understand dynamic programming | Deterministic Dynamic Programming, | Chapter 12 (T1)  12.1,12.2,12.3,12.3.1 |

**5 .Evaluation Scheme:**

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| **Component** | **Duration** | **Weightage (%)** | **Date & Time** | **Nature of Component** |
| Mid-Semester Test | 90 mts | 35 | 10/03 9.00am to10.30am | Closed Book |
| Project (Report & Seminar) |  | 25 (15+10) | Details will be discussed in the first class | Open Book |
| Comprehensive Examination | 2 hours | 40 | 06/05 FN | Open Book (50%)  Closed Book (50%) |

**6. Make-Up Policy:** Only genuine cases will be entertained.

**7. Consultation Hour:** To be announced in the class.

**8. Notice:** Notices concerning this course will be displayed on CMS

**9.Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**INSTRUCTOR‑IN‑CHARGE**